

This listing of claims will replace all prior versions, and listings, of claims in the application

LISTING OF CLAIMS

1. (Currently Amended) A front-end circuit for a multi-mode device at least
5 ~~one of a multi-mode and multi-band communication terminal device~~, comprising:
at least one switch element comprising a multiple switch selected from the
group consisting of RF switches, duplexers and diplexers;
a common antenna;
a first transmission system being an FDD/TDD a mixed mode transmission
10 ~~system configured to operate in a mixed FDD/TDD mode;~~
a second transmission system being a pure FDD mode transmission system
~~configured to operate in a pure FDD mode;~~
a third transmission system being a pure TDD mode transmission system,
said third transmission system comprising a transmit path and a
15 receive path; and
~~mixed mode filters provided for said first transmission system;~~
~~pure mode filters provided for said second transmission system; and~~
a connecting circuit via which a signal path of said first transmission system, a
signal path of said second transmission system, said transmit path and
20 said receive path of said third transmission system ~~individual filters of~~
~~said mixed mode filters and said pure mode filters~~ are connected to
said common antenna, said connecting circuit comprising said multiple
switch at least one switch element;
wherein said multiple switch switches between said signal path of said first
25 transmission system, said signal path of said second transmission

system, said transmit path of said third transmission system and said receive path of said third transmission system.

2. (Original) The circuit according to claim 1, further comprising:

5 a diplexer;

wherein a transmission band and a reception band of a transmission system form a band pair, a frequency difference between band pairs of a first and of a second transmission system amounts to approximately one octave, said diplexer being arranged between said common antenna and said filters for distinguishing between said band pairs.

3-4. (Canceled).

5. (Original) The circuit according to claim 1, further comprising a low pass filter as a transmission filter.

6. (Original) The circuit according to claim 1, further comprising a diplexer for separating a transmission band and a reception band for said FDD mode in said pure FDD mode transmission system or in said mixed mode transmission system, said diplexer having a band pass filter or a steep-edge low pass filter as a filter for a transmission path.

7. (Currently Amended) ~~The circuit according to claim 27, further comprising~~
A front-end circuit for a multi-mode communication terminal device,

comprising:

at least one switch element selected from the group consisting of RF
switches, duplexers and diplexers;

a common antenna;

a first transmission system being a pure mode transmission system
configured to operate in a pure TDD mode;

a second transmission system being a pure mode transmission system
configured to operate in a pure FDD mode;

filters provided for said first and second transmission systems;

a connecting circuit via which individual filters of said filters are connected to
said common antenna, said connecting circuit comprising said at least
one switch element;

said filters comprising a first filter, a second filter, and a third filter, said first
filter being a transmit filter of said FDD system, said second filter being
a common receive filter for said TDD system and said FDD system,
and said third filter being a transmit filter for said TDD system;

a duplexer formed by said first filter and said second filter; and

a switch element comprising an RF switch to connect said common antenna
with one of said duplexer and said third filter.

~~a common filter for two reception bands for said mixed mode transmission
system, said common filter being part of a duplexer for separating a
transmission band and a reception band of said pure FDD mode
system; and~~

~~a further filter for a transmission band of said pure FDD mode transmission
system; and~~

~~an RF switch between said common antenna, said further filter and said
duplexer.~~

8. (Currently Amended) The circuit according to claim 7 ~~27~~, further comprising:

an RF switch between a common transmission path for said pure FDD mode transmission system and said pure TDD mode transmission system and two transmission filters; and

an RF multiple switch at said antenna for switching between a duplexer for said FDD mode, a transmission filter and a reception filter for said TDD mode;

frequency bands of said mixed mode transmission system being clearly spaced from one another.

9. (Original) The circuit according to claim 1, further comprising filters and signal paths for a further transmission system with pure FDD or pure TDD mode in addition to said transmission system with mixed FDD/TDD mode and said transmission system with pure FDD or TDD mode.

10. (Original) The circuit according to claim 9, further comprising:

an RF switch at an antenna side of said circuit for a TDD system; and a duplexer for each FDD system.

11. (Original) The circuit according to claim 10, further comprising:

a diplexer; and

components for a further mixed transmission system in addition to said mixed and said two pure systems, at least one mixed transmission system being separated from other transmission systems at said antenna side by said diplexer.

12. (Original) The circuit according to claim 1, wherein said switches are fashioned as GaAs FET transistors.

5 13. (Original) The circuit according to claim 1, wherein said switches are realized with PIN diodes having additional phase shifters.

10 14. (Currently Amended) The circuit according to claim 1, wherein said at least one switch is formed as a component comprising at least one of a component selected from the group consisting of GaAs FET transistor and a PIN diode having additional phase shifters, wherein at least one of said pure-mode filters or said mixed-mode filters is realized as an independent component, comprising at least one filter selected from the group consisting of a SAW filter, an MWK filter, an FBAR filter, a strip-line filter, and an LC filter .

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15. (Original) The circuit according to claim 1, wherein individual components of the circuit are arranged in a discrete manner on a common printed circuit board.

20 16. (Original) The circuit according to claim 1 wherein at least a part of discrete components of said circuit is integrated in a common substrate.

25 17. (Original) The circuit according to claim 16, wherein all individual components together with a DC drive are integrated in a common substrate that is realized in a multi-layer technique with partially planar structures.

18. (Previously Presented) The circuit according to claim 1, further comprising a directional coupler for regulating power of a power amplifier as part of a detector of at least one transmission input.

5 19. (Previously Presented) The circuit according to claim 1, further comprising a protective element that protects a transmission amplifier against feedback or reflected power and is selected from a group consisting of an insulator and a circulator, and is arranged between a transmission amplifier and a transmission filter.

10 20. (Original) A mobile radiotelephone device of the third generation, comprising:

 a front-end circuit for a communication terminal device with a multi-band and/or multi-mode transmission system, comprising:

15 at least one switch element selected from the group consisting of RF switches, duplexers and diplexers;

 a common antenna;

 mixed mode filters for a mixed mode transmission system with a mixed FDD/TDD mode; and

20 pure mode filters for a pure mode transmission system with a pure FDD or pure TDD mode;

 wherein individual filters of said mixed mode filters and said pure mode filters are connected to said common antenna via a circuit with said at least one switch element, and said mobile radiotelephone device being
25 operated in a system of the third generation.

21. (Original) A mobile radiotelephone device, comprising:

a front-end circuit for a communication terminal device with a multi-band and/or multi-mode transmission system, comprising:

at least one switch element selected from the group consisting of RF switches, duplexers and diplexers;

5 a common antenna;

mixed mode filters for a mixed mode transmission system with a mixed FDD/TDD mode; and

pure mode filters for a pure mode transmission system with a pure FDD or pure TDD mode;

10 wherein individual filters of said mixed mode filters and said pure mode filters are connected to said common antenna via a circuit with said at least one switch element, and said mobile radiotelephone device being operated in a system of the second and the third generation.

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22. (Original) A front-end circuit for a communication terminal device with a multi-band and/or multi-mode transmission system, comprising:

at least one switch element selected from the group consisting of RF switches, duplexers and diplexers;

20 a common antenna;

FDD pure mode filters for a pure mode transmission system with a pure FDD mode; and

TDD pure mode filters for a pure mode transmission system with a pure TDD mode;

25 wherein individual filters of said FDD pure mode filters and said TDD pure mode filters are connected to said common antenna via a circuit with said at least one switch element.

23. (Original) The circuit according to claim 22, further comprising an RF switch between a common transmission path for said pure FDD mode transmission system and said pure TDD mode transmission system and two transmission filters.

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24. (Previously Presented) A front-end circuit for a multi-mode communication terminal device, comprising:

at least one switch element selected from the group consisting of RF switches, duplexers and diplexers;

10 a common antenna;

a first transmission system being a mixed mode transmission system configured to operate in a mixed FDD/TDD mode;

a second transmission system being a pure mode transmission system configured to operate in a pure FDD mode or a pure TDD mode;

15 mixed mode filters provided for said first transmission system;

pure mode filters provided for said second transmission system;

a connecting circuit via which individual filters of said mixed mode filters and said pure mode filters are connected to said common antenna, said connecting circuit comprising said at least one switch element;

20 wherein frequency bands of mixed mode and pure mode systems are overlapping or adjacent to each other.

25-27. (Canceled).

28. (Currently Amended) The circuit of claim 7 ~~27~~, wherein frequency bands of said first and second transmission systems are overlapping or adjacent to each other.

5 29. (Previously Presented) The circuit according to claim 1, wherein said switch is a duplexer, wherein said duplexer is realized as an independent component and comprises at least one filter selected from the group consisting of a SAW filter, an MWK filter, an FBAR filter, a strip-line filter, and an LC-filter.

10 30. (New) The circuit according to claim 7, further comprising:
a common transmit path for said TDD system and said FDD system; and
a further RF switch to connect said common transmit path with one of said
second filter and said third filter.

15 31. (New) A front-end circuit for at least one of a multi-band and a multi-mode device, comprising:
a common antenna;
a multiple switch connected to said common antenna;
a first transmission system comprising a transmit path and a receive path,
20 said first transmission system being configured to operate in one of a
pure TDD mode and a mixed TDD/FDD mode; and
a second transmission system;
wherein said multiple switch switches between said transmit path, said
receive path of said first transmission system and said second
25 transmission system.

32. (New) The circuit according to claim 31, wherein:

said second transmission system comprises a transmit path and a receive path, said second transmission system operating in one of a pure TDD mode and a mixed TDD/FDD mode; and

5 said multiple switch additionally switches between said receive path and said transmit path of the second transmission system.

33. (New) The circuit according to claim 31, wherein:

10 said second transmission system comprises a transmit filter and a receive filter;

said second transmission system operates in a pure FDD mode; and

said transmit filter and said receive filter of said second transmission system form a duplexer.

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34. (New) The circuit according to claim 31, wherein:

a transmit filter is arranged in said transmit path of said first transmission system; and

20 a receive filter is arranged in said receive path of said first transmission system;

said receive filter of the first transmission system is a band-pass filter; and

said transmit filter of the first transmission system is one of a band-pass filter and a low-pass filter.

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35. (New) The circuit according to claim 33, further comprising:

a further switch to switch between said transmit path of said first transmission system and a transmit path of said second transmission system;

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wherein said duplexer is arranged between said multiple switch and said further switch.